SUMMARY

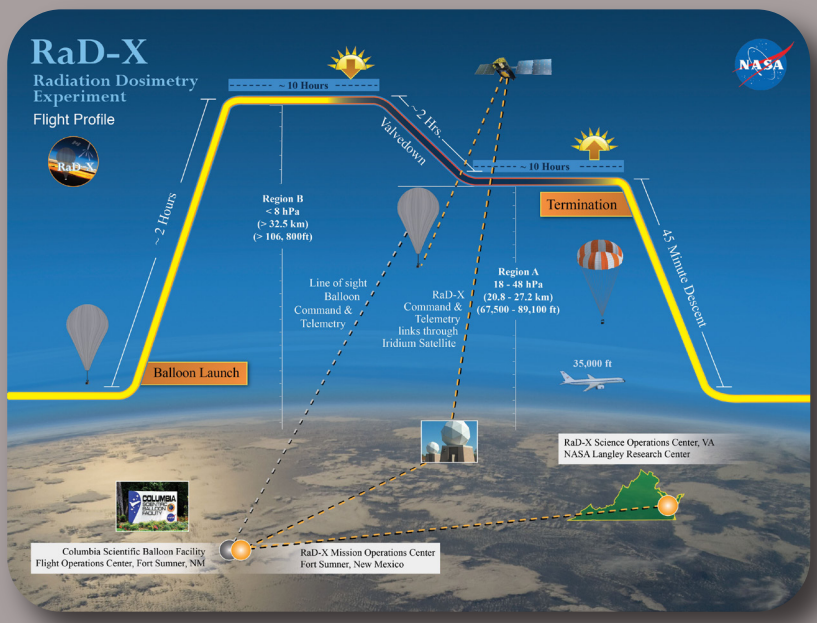
RaD-X

What is RaD-X?

NASA's high-altitude balloon project, known as NASA's Radiation Dosimetry Experiment, or RaD-X, will provide first-time indications of how cosmic rays deposit energy in the upper atmosphere. The RaD-X microsatellite structure will fly on a scientific research balloon for 24 hours to measure cosmic ray energy at two separate altitude regions in the stratosphere -- above 110,000 feet and between 69,000 to 88,500 feet. The flight will validate low-cost sensors for future missions and will provide data that may improve the health and safety of future commercial and military aircrews and space crews.

RaD-X contributes to NASA's Heliophysics Division Living With a Star (LWS) Program's goal to understand those aspects of the connected sun-Earth system that affect life and society by improving prediction of biologically harmful radiation exposure to air travelers and by enhancing the understanding of cosmic ray transport processes and interactions with the atmosphere.

The RaD-X microsatellite structure was developed at NASA's Langley Research Center, where the project is managed. RaD-X has partnered with NASA's Ames Research Center for expertise on radiation detectors, and NASA's Wallops Flight Facility for expertise with high-altitude balloons.



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Why Should We Study Energy in the Upper Atmosphere?

Earth's atmosphere and magnetic field provide protection from harmful space radiation caused by flares from the sun and cosmic rays from outside our solar system. Space radiation is different from most kinds of radiation we experience here on Earth, such as UV rays, but is still a concern at higher altitudes and near Earth's poles. Particles that make up space radiation can cause adverse effects to the human body, such as DNA damage inside the cells that can possibly lead to genetic disorders, cancer, heart and gastrointestinal problems, cataracts and brain and nerve dysfunction.

Pilots and crews working in the aviation industry are classified as radiation workers by the International Commission on Radiological Protection due to the amount of time spent in Earth's upper atmosphere where there is less protection from space radiation. Exposure to space radiation is even higher for astronauts living and working aboard the International Space Station, 250 miles above Earth, and a journey to Mars will require crews to remain beyond the protection of Earth's atmosphere for approximately two and a half to three years. Learning how to protect humans from the effect of radiation exposure could help engineers develop new ways to minimize radiation exposure for aircraft crews and will also be a critical step for the future of space exploration.

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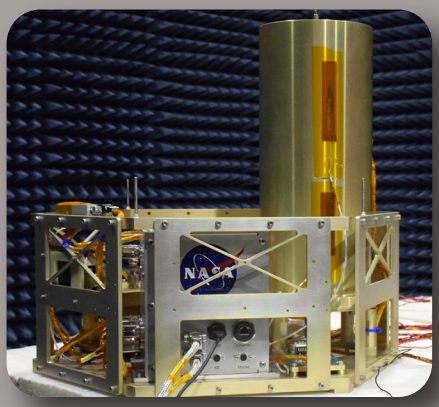
RaD-X



RaD-X HARDWARE

Low-cost, Low-risk, Big-return

Small satellite missions, like RaD-X, provide NASA with valuable opportunities to test emerging technologies and economical commercial off-the-shelf components, which may be useful in future space missions.

These ground- and balloon-based measurements complement NASA's fleet of space satellites, and place useful tools, like NASA's Nowcast of Atmospheric Ionizing Radiation for Aviation Safety (NAIRAS) model, at our fingertips. RaD-X will improve NAIRAS, a NASA-funded Applied Sciences Program to develop an operational prototype for a global, real-time, data-driven predictive system needed to assess biologically harmful radiation exposure levels for aviation. NAIRAS could be used by public and private entities for informed decision-making about radiation exposure safety for flight crews, the general public, and commercial space operations.

Cubes in Space

RaD-X will also host the first Cubes in Space (CiS) flight opportunity. CiS is a global STEAM-based education program for students (ages 11-18) that provides a no-cost opportunity to design and compete to launch an experiment into space. The small cubes are placed on sounding rockets and scientific balloons in cooperation with NASA's Wallops Flight Facility and the Earth Systems Science Pathfinder Program Office. RaD-X, one of two CiS opportunities, will carry more than 100 small cubes filled with experiments created by students around the U.S.

NASA's RaD-X Team

NASA's HOPE Project

In 2013, RaD-X was chosen as a part of NASA's Hands-On Project Experience (HOPE) project, a cooperative workforce development program sponsored by the Science Mission Directorate and the Office of the Chief Engineer's Academy of Program/Project and Leadership (APPEL). The HOPE Training Program provides an opportunity for a team of early-career and career transitional NASA employees to propose, design, develop, build and launch a suborbital flight project over the course of 18 months. The purpose of the program is to enable practitioners in the early years of their careers to gain the knowldege and skills necessary to manage NASA's future flight projects.